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INVESTIGATION OF ELECTROMAGNETIC EFFECTS ON REINFORCED CONCRETE STRUCTURES.

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Currently the studies proving the adverse effects of electromagnetic waves on living organisms are being actively conducted all over the world. It is believed that the human body is sensitive to the electric current flowing in it. Such currents occur if there is some kind of electrical devices nearby. People actively protest against the installation of transmitting antennas on the roofs of their houses. They are afraid to buy housings near the power lines. This is a fear of disease they can get under the strong influence of electromagnetic waves. And how do the buildings perceive the electromagnetic waves? After all, modern metropolises have a strong general electromagnetic background.

Now the main structural material for buildings and structures is reinforced concrete. More than two hundred years experience in the construction of reinforced concrete structures confirms its undeniable advantages: a high speed of the construction works, both in the case of monolithic and precast concrete; an excellent quality if all the requirements for construction are respected; modern design solutions permit to build houses of concrete that go beyond the seismic requirements. It is possible to add personality and expressiveness to the buildings made of reinforced concrete, thanks to the huge number of possible architectural shapes. In addition, the concrete continues to gain strength over time. But despite all these undeniable advantages, the concrete structures have the disadvantage that shortens the service life of buildings. It is a reinforcement corrosion. It is well known, that the concrete perceived mainly the compressive forces and reinforcing bars and cages serve for tensile and bending. Over time, the metal begins to corrode and stops responding to the requirements of the carrying capacity. Rust formed on the surface of the reinforcement, increases the volume of the rods, which leads to cracking of concrete cover and expose the reinforcement.

In the reinforced concrete buildings, interconnected reinforcing turns to the antenna of colossal dimensions, which forms a circular currents in the medium adjacent to it – in a cement stone. Consequently, the circular currents (or "displacement currents"), one way or another affect the substance and structure of concrete. In the space of isotropic dielectric

displacement currents are out of touch with the elements of the structure of the medium and behave like the electromagnetic field with the absence of mass transfer. To set in motion the matter of concrete as a material flow of particles it is necessary to get the external field of very high tension, which would have its negative impact on living creatures. Field of such a great intensity probably would cause and direct ionization of the metal fittings, tearing ions with fixed positions in the lattice. But there are no such fields in the background field of the city.

However, because of the presence of water vapor and groundwater, the picture changes. This is due to the property of concrete as a porous material, even under normal conditions, to be filled up by the capillary related polar liquid (water and salt solutions). The same applies to concrete structures. The corrosion is actively developing in them exactly in contact with the aqueous medium if the protection is not enough and quality is low (it is problematic enough to ensure it out of the factory conditions). But in the absence of background electromagnetic field the filling of pores occurs quite slowly, allowing to the constructions to maintain a sufficient bearing capacity for a long time. The presence of the field and bias currents leads to the interaction of the dipole and ionic structures (water and electrolytes) with the currents and to the effect of vapor and liquid phase suction in the lumen of capillaries. Thus, the presence of an electromagnetic field is the catalyst for starting the process of water saturation of concrete body pores.

Then, the corrosion development process starts by the electrochemical mechanism with the movement of metal ions Fixtures ("iron" ions) in the liquid phase capillary clamped "water" with their subsequent connection to the hydrate, carbonate, etc., complexes, accompanied by a decrease of mechanical strength of the structure.

In addition to the accelerating of the process of corrosion in reinforced concrete structures, the negative effects of electromagnetic fields directly on the metallic elements in reinforced concrete structures were revealed: at a given temperature and load the constant magnetic field increases the speed of plastic deformation. This phenomenon can be observed, starting with a certain threshold intensity of the magnetic and electric fields. The impact of sufficiently strong electromagnetic fields has a bad effect on the properties of metals, fracture occurs sooner.

This phenomenon is still not study enough. It is a vast field for further research.

Possible way of resolving this problem may be to apply the principle of new concrete. It should have a structure with a minimum amount, or a complete lack of pores to provide protection for reinforcement of interaction with water. This material should have high workability and fill the space between reinforcing bars and cages completely. This is even more necessary as in the construction site is not always possible to make up a quality control work connected with the concrete mix laying. A defect sites, even after repairs are vulnerable points of the construction. The human factor should be maximum excluded. The work with these materials has been ongoing for a long time, and there are positive findings. But a problematic start of mass production and as a result the high cost of material becomes the barrier to the use of them outside the lab.

Likewise, the use of structural barriers, or additional chemical isolation structures and their elements can become a possible solution.

The importance of this problem at the Krasnoyarsk Region is particularly high due to the massive construction of mobile towers, designed to provide quality signal across the province. And the boundaries of the city is constantly expanding, moving to the antenna fields, to the powerful substations, that will undoubtedly exert their influence not only on individuals but also on the building in which they live.